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dates, so far as they have appeared. January, March 1st; February, May 31st; March, June 28th; April, August 15th; May, September 28th; June, December 1st; July, November 18th; August, January 5th, 1890; September, February 4th, 1890. The numbers for the present year, it is anticipated, will be issued on time.

RECENT LITERATURE.

"Challenger" Voyage.—W. P. Sladen's Asteroidea.[1]—The thirtieth volume of the Challenger Reports is a double one, consisting of 935 pages of text, and of 118 plates and a map. The report does not confine itself to the star fishes collected by the Challenger, but includes also those taken by the Lightning, Porcupine, Knight-Errant, and Triton. In the Challenger collection were 268 species belonging to 84 genera, and of these 184 forms are described as new. The total number of new species described in the work is 196, besides 15 forms that are considered as only varieties. Mr. Sladen reduces Perrier's 52 genera to 49, three of the genera proving invalid or synonymous, and the Challenger Expedition furnished examples of 38 of these previously known genera. So large a number of new genera have been described that the synoptic list of all known species of recent Asteroidea, given at the end of the Report, enumerates 137 genera and 810 species.

The long list of of abyssal Asteroids brought to light by the Challenger and other deep sea expeditions, has opened a new chapter in the history of the Asteroidea, and Mr. Sladen has attempted a classification upon a new basis, more in accordance with morphological characters than preceding ones. The fundamental points of structure selected by Mr. Sladen are: (1) those which adapt the organism for the functions of respiration and excretion; (2) the character of the ambulacral skeleton; and (3) that of the ambital skeleton.

For the first he chooses the organs called "papulæ" by Stimpson, transparent membranous cæca which penetrate the body wall, and permit an exchange by osmosis with the free fluid without. These papulæ may be confined to a limited area on the abactinal surface, never passing beyond the boundary of the supero-marginal plates (Stenopneusia); or they may pass beyond this boundary, and occur upon the lateral walls and actinal surface (Adetopneusia). Mr. Sladen regards the former group as the more primitive, and states that the young of the second group pass through a stage which represents that of the adults of the first.

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[1] Voyage of H. M. S. Challenger. Report on the Asteroidea collected during 1873-76. By W. Percy Sladen, F.L.S., F.G.S. Vol. XXX. 1889.

The production of the ambulacral element in some star-fishes is much more rapid than general growth, thus producing a crushing together of the plates in the direction of the length, in some cases carried to such an extent that the tube-feet in each furrow become quadriserial. This last character is not looked upon as of sufficient importance to define the primary subdivisions of the class. The group in which this ambulacral crowding occurs is called Leptostroteria, while the group in which ambulacral development proceeds *paripassu* with that of other parts of the body, is the Eurystroteria, and is by Mr. Sladen considered the older. Embryology supports this view.

The ambital skeleton, formed of the marginal plates and their supplementaries, is looked upon as one of the most important systems of plates in determining form and superficial character. Here there are also two distinct modes of growth, that in which these plates increase rapidly, and continue to develop throughout the life of the star-fish (Phanerozonia), and that in which these plates do not increase in size, but, on the contrary, become relatively smaller as other parts increase (Cryptozonia). The Phanerozonia are regarded as the more primitive, especially as the young of a cryptozonate asteroid is phanerozonate.

Two orders of the Euasteroidea are thus formed, the one, Phanerozonia, combining also the stenopneusid and eurystroterid characters; while the other, Cryptozonia, combines the adetopneusid and leptostroterid characters. In the first order are placed the families Archasteridæ, Porcellanasteridæ, Astropectinidæ, Pentagonasteridæ, Antheneidæ, Pentacerotidæ, Gymnasteriidæ, and Asterinidæ; while in the Cryptozonia are those of Linckiidæ, Zoroasteridæ, Stichasteridæ, Solasteridæ, Pterasteridæ, Echinasteridæ, Heliasteridæ, Asteriidæ, and Brisingidæ. The Asterinidæ, with their comparatively small marginal plates, approach the Linckiidæ, in which the plates are large for the group. Mr. Sladen's classification is certainly the clearest that has been as yet formulated, and it is cheering to note that its author views all classification as nothing more than a working key of our views of affinity.

Not less than 109 species and varieties were found at depths of from 500 to 2500 fathoms. In most cases the actinal and abactinal aspects of two to four species are given on one or more plates, and are succeeded by magnified details of the more important external characters.